

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A clock extracting device of a disc reproducing apparatus, comprising:

an information read-out means for reading information signals from a disklike information recording medium;

a voltage control oscillator;

a phase comparator for comparing a phase of the information signals read by the information read-out means and a phase of an output of the voltage control oscillator;

a frequency comparator for comparing a frequency of the information signals read by the information read-out means and a frequency of the output of the voltage control oscillator;

a speed sensor for detecting the frequency of the output of the voltage control oscillator at a reference clock so as to output a speed signal corresponding to the detected frequency;

a gain command unit for determining a plurality of speed ranges divided by a predetermined reference value and designating a loop gain of a clock extracting circuit in accordance with a range signal indicating in which one of the speed ranges the speed signal outputted from the speed sensor falls;

a charge pump which discharges or draws electric current in accordance with outputs of the phase comparator and the frequency comparator and changes over an output current value in accordance with a gain command of the gain command unit; and

a series circuit of a resistor and a capacitor, whose one end is connected to an output of the charge pump and the other end of which is grounded or is connected to a reference voltage;

wherein an output voltage between the opposite ends of the series circuit acts as a control voltage for the voltage control oscillator and the gain command unit issues the gain command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals;

wherein the loop gain of the clock extracting circuit is raised when the read rate of the information signals increases; and

wherein the loop gain of the clock extracting circuit is lowered when the read rate of the information signals decreases.

2. (Currently Amended) A clock extracting device of a disc reproducing apparatus, comprising:

an information read-out means for reading information signals from a disklike information recording medium;

a numerical control oscillator;

a phase comparator for comparing a phase of the information signals read by the information read-out means and a phase of an output of the numerical control oscillator;

a frequency comparator for comparing a frequency of the information signals read by the information read-out means and a frequency of the output of the numerical control oscillator;

a speed sensor for detecting the frequency of the output of the numerical control oscillator at a reference clock so as to output a speed signal corresponding to the detected frequency;

a gain command unit for determining a plurality of speed ranges divided by a predetermined reference value and designating a loop gain of a clock extracting circuit in accordance with a range signal indicating in which one of the speed ranges the speed signal outputted from the speed sensor falls;

a multiplier for changing a multiplication factor in accordance with a gain command of the gain command unit so as to amplify outputs of the phase comparator and the frequency comparator; and

a digital filter for amplifying a low frequency band of an output of the multiplier;

wherein an output of the digital filter acts as a control input for the numerical control oscillator and the gain command unit issues the gain command such that the loop gain of the clock extracting circuit secures a desired operating point in accordance with a read rate of the information signals;

wherein the loop gain of the clock extracting circuit is raised when the read rate of the information signals increases; and

wherein the loop gain of the clock extracting circuit is lowered when the read rate of the information signals decreases.

3. (Currently Amended) A clock extracting device as claimed in Claim 1, wherein the gain command unit ~~issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls~~ has a plurality of predetermined reference values.

4. (Currently Amended) A clock extracting device as claimed in Claim 2, wherein the gain command unit ~~issues the gain command in accordance with a range signal indicating in which one of a plurality of speed ranges divided by one predetermined reference value or more the speed signal falls~~ has a plurality of predetermined reference values.

5. (Original) A clock extracting device as claimed in Claim 3, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

6. (Original) A clock extracting device as claimed in Claim 4, wherein even if the range signal changes upon change of the speed signal from one of the speed ranges to a neighboring one of the speed ranges, the gain command unit does not change the gain command when a difference between the speed signal and the predetermined reference value for dividing the one and the neighboring one of the speed ranges is not more than a predetermined value.

7. (Original) A clock extracting device as claimed in Claim 3, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

8. (Original) A clock extracting device as claimed in Claim 4, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

9. (Original) A clock extracting device as claimed in Claim 5, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

10. (Original) A clock extracting device as claimed in Claim 6, wherein even if the range signal changes, the gain command unit does not change the gain command during a predetermined period after the gain command has been changed.

11-20. (Canceled)